BURNER MEETING

7/16/91
SLC

B&W
LADWP PDMN
PDNE
IPSC Staff

Paul Choffeii Burners
Bill Smith

last meeting - May
Since then
Discussion w/ RJM

Need: Schedule of events

test or all 48
Ohio Edison
Burner Throat
50" → ~~35~~ 38
Black Hills
Orlando 450mw
XCL burners

Burner (Heat) Input

Entire Assemblies
New
Changes:
- New - slip seal arrangement
- not trimmed doors
- 3pm vane - push/pull (New)
- slip seal mods
- → HD registers
  - 1 piece
- floating backplate
  - separate hot part

Walk Through: Burner Redesign

Not changing configuration
flows | operation | setup

temp 1250° from 1350
cooling air

Material Change: 800H — to all ~~temp~~ radiant surfaces
1/8"
expect nozzle tip

temperature gradients

thermal response from B&W

No finite element analysis conducted
- thermal loading
- boundary conditions
- thermal gradients ΔT radiant to sec air temp

3-D inelastic $50K
elastic (worst pinpoint warpage)
characteristic

Predict displacement - stress levels
warpage

Needs - temp profiles

test program? trial + error

alternatives ~~options~~: Backup rolled angle ~~around~~ attached circumference
Rear plate - ~~insulated~~ insulation ~~opt~~ alternatives
perforate reflective coatings

Thermal Expansion
2 curves Allowable Stress Values

IP7_003800

temperatures: Instr 1 burner up w/TCs

worst temps? where?

800 H- slow weld

melting of SS / oxidation

Recommendation BW Build + try

Trichisky Cooling Flow ?

Nozzle tips - overheating

purge air

not on PC burners

Slip seal - rope packing replaceable each outage

rails - supports sliding

Nozzle Tip T/C 1350 material + thickness

instrument T/C - air flow on 1 row ?

Approach: See Air Flow Balancing

Shrouding/balance at full load ↑pressure drop

4X its w o/s

not enough ΔP on min air flow

internal adjustable / then anchor

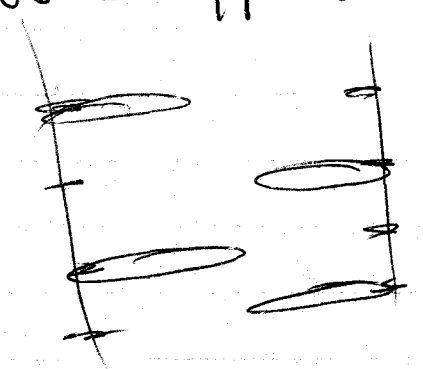
B&W Shrouds to increase overall Burner ΔP
inner & outer register

B&W new
XCL burner - control flow separate then spin

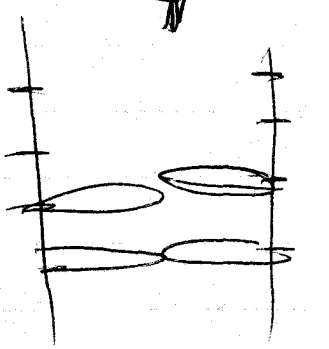
RJM-

American Electric Power

Recommendation:
Opposed fired
vs staggered



optimum



test TICs- 48perburner X 6 burners

BMW Approach:

Test + Evaluate

IBC? List of Expectations

BMW

1 Conduct FEA → support

fall outage ② field temp profiles
cooling theory [pinch registers]

test program after outage
data collection

③ A Conduct computer flow model [Window arrangement] flow balancing

B Cold Air balancing → shrouds [banding

Air Flow Metering

→ Cost Estimates

- Release Detail Engr
  - ↳ PMOS
  - schedules drop dead date

Scenarios (a) dedicate
- Oil / Coal (or) condition

Class I NPA
Class II discrimination

can't afford any degradation

Different style

Summer

Nissen
7/16/91

B&W'S PROPOSED BURNER DESIGN UPGRADE REVIEW MEETING

AGENDA

OUTSTANDING ISSUES

I. OVERHEATING

A. Objective- Extend life of burners and minimize routine maintenance requirements by eliminating the overheating and thermal expansion damage.

Concerns-

1. Material Considerations
2. Outer Air Assembly Rearplate Thermal Compensation and Restraint
3. Coal Nozzle Tip Overheating
4. Air Sleeve Casing Overheating
5. Casing Seal Arrangement
6. Modeling Confirmation- Finite Element Analysis

II. SECONDARY AIR FLOW

A. Objective- Establish cooling air flows across the burner fronts to eliminate overheating when the burners are not in service, yet ensure uniform air distribution while burners are in-service.

1. Two Position Outer Register Settings
2. Cooling Air Flow Requirements
3. Burner Front Temperature Requirements
   a. ~~Thermocouple~~ requirements?

B. Objective- Eliminate flue gas recirculation back into the burners which has been causing coal nozzle tip pluggage and slagging on the inner and outer air sleeves, plus fly ash accumulation in the windbox.

1. Resolve Flue Gas Recirculation back into the Burner (eliminate slagging and fly ash lick back)
2. Determine Velocity Profiles of the three air zones (primary, inner (spin) and outer air zones)

C. Objective- Balance secondary air flows from burner to burner

(across a burner level) without having to use the air registers to accomplish this (which are required for flame adjustments).

1. Balance Burner to Burner Air Flows
   a. Air Flow Modeling
   b. Testing

D. Objective- Balance secondary air flows on a row to row and on a front wall to back wall basis to achieve appropriate secondary air flow ratios.

1. Balance Individual Burner Rows
   a. Air Flow Modeling
   b. Balancing

2. Air Flow Monitoring and Control

III. BURNER LINE FIRES

A. Objective- Stop burner line fires by establishing air flow profiles which eliminate recirculation into the coal nozzles (in both in and out of service conditions).

1. 100% Cold Primary Air Flow Sweep on Start and Stop

2. Eliminate Flue Gas Recirculation into Nozzle

3. Eliminate Burner Line Fires

IV. BURNER SETUP

A. Objectives- Determine burner operating parameters.

1. Relative Air Flow Quantities (Inner to Outer to Primary Air)

2. Windbox Pressure Drops (I/S and O/S)

3. Register Positions
   a. Inner (spin) vane positions
   b. Backplate setting
   c. Outer Register Position

4. Cooling Air Flow Requirements

5. Burner Front Temperature

V. BURNER OPERATION AND PERFORMANCE

A. Objective- Maintain and/or improve combustion and operating parameters of the burners. These parameters include:

a. NOx emission levels (maintain at or below 0.44 lbs/MBtu)
b. O2 levels of 3.2% (design) or less with ranges (maximum to minimum) of less than 1.5% O2
c. CO levels of 150 ppm or less with ranges (maximum to minimum) of less than 75 ppm
d. LOI ash levels of less than 1.0% (with 70% thru 200 mesh coal)
e. secondary air flow balancing of +/- 3% from burner to burner
f. out of service cooling air flow requirements
g. burner front operating temperatures (I/S & O/S)
h. boiler efficiency levels

B. Objective- Improve maintenance and operating conditions on the burners. These parameters include:

a. minimize eyebrow formation
b. eliminate flue gas recirc (slagging and fly ash in burner)
c. improve scanner performance
d. extend burner life
e. minimize maintenance requirements

VI. BURNER TESTING

A. Objective- Test operating and performance conditions of the burners to determine acceptability of the modifictaions.

1. Test the fore mentioned parameters.

Need: Test Plan
north-spider

testing
install diffuser

Fuel Flow

Burners

B+W

Recommendations:

Design

Schedule
Storewalking

Program 48
?no test 6 operability

EER
NewKirk
RJM

B&W Septfact Assembly
Test Program

B&W: Peter Wanders
Al LaRose
→ Paul Chioffie
Bill Smith (his boss

Gale

Warranty. Previous expired May 1, 1991
later ~~late~~ defect? Maint aspects
Operability
Obligations

Change Order Existing Contract
vs Open Bid

FORCE - A - DESIGN? RJM
Warranty - / Liability / Guarantee

Capital Projects

Concerns

No nozzle supplied (conical diffuser)
(BW not considering it a problem)
- Design deficiency
plugage / overheat / warpage / fail

Register Handles - No guards?

Requiring 4 T/C's
Whose expense
displayed

slip seal - pretty vague

lighter shrouds
Request same / existing operating conditions

letter confidentiality

Cancel - 2pt actuators

D —
Pls copy
CDJ, AEN, JKH, JN
6/24

7401 West Mansfield Avenue
Suite 410
Lakewood, CO 80235
(303) 988-8203

June 14, 1991

Request Al LaRoe

Power

1

Re: Intermountain Power Project
Burners

the revised DRB, the IPSC staff developed the following
tions are listed below with responses.

section of the new coal nozzle also be 800H? Is there a special procedure for welding 800H to carbon steel?

A. The 800H material was proposed for register parts to increase strength for resistance to buckling. This was not considered necessary for the nozzle tips which would remain 309 stainless. Since the nozzle tips are fabricated from rolled plate, 800H material could be used if the customer desires. All welding procedures for 800H material will be specified by Technology when and if the proposed burner arrangement is detailed.

how are they addressing this deficiency

Q. Do the register doors still require trimming? Would we do this in the shop, or wait until field observations?

A. The intent of the design is to eliminate backplate warpage such that the register doors will not require trimming.

How? by tanking up

Q. Would it be appropriate to add stiffener's to the "floating" section of the backplate? (This would be to further resist dishing.)

A. Differential expansion between the plate and stiffeners is considered to be a potential problem. The concept of the floating plate is to eliminate the thermal stress that was causing warpage.

doesn't eliminate

D — Pls copy CDJ, AEN, JKH, JN 6/24

Babcock & Wilcox

a McDermott company

7401 West Mansfield Avenue
Suite 410
Lakewood, CO 80235
(303) 988-8203

June 14, 1991

Request Al LaRoe

Department of Water & Power
City of Los Angeles
111 N. Hope Street
Room 604
Los Angeles, CA 90051

Attn: Raffi Krikorian

Re: Intermountain Power Project
Burners

Dear Raffi:

During discussions of the revised DRB, the IPSC staff developed the following questions. These questions are listed below with responses.

Q. Would the alloy section of the new coal nozzle also be 800H? Is there a special procedure for welding 800H to carbon steel?

A. The 800H material was proposed for register parts to increase strength for resistance to buckling. This was not considered necessary for the nozzle tips which would remain 309 stainless. Since the nozzle tips are fabricated from rolled plate, 800H material could be used if the customer desires. All welding procedures for 800H material will be specified by Technology when and if the proposed burner arrangement is detailed.

how are they addressing this deficiency

Q. Do the register doors still require trimming? Would we do this in the shop, or wait until field observations?

A. The intent of the design is to eliminate backplate warpage such that the register doors will not require trimming.

How? by tacking up

Q. Would it be appropriate to add stiffener's to the "floating" section of the backplate? (This would be to further resist dishing.)

A. Differential expansion between the plate and stiffeners is considered to be a potential problem. The concept of the floating plate is to eliminate the thermal stress that was causing warpage.

doesn't eliminate

Q. The quadrant handle continues to drift away from the notched plate on the existing burners. Any change to the new?

A. As things stand today, there are no quadrants on the burner. We have been advised IPSC now wants electric drives on the outer air registers. Both the spin vanes and inner air sliding disks are actuated by push/pull handles.

Q. What are our recommended TC locations on the new burner? Can they be shop installed?

A. Minimum thermocouples will be 1 each on the nozzle tip, inner air zone sleeve, throat sleeve, and register backplate. We have always hesitated to install thermocouples in the shop due to breakage during shipping and installation.

Q. Due to differential expansion between the front plate and the slip seal casing, do we really believe the packing will stay? If the gap is tight enough to hold the packing hot, how do you repack cold?

A. The new slip seal arrangement was designed to eliminate the differential and high temperatures at the rope packing. This will need to be evaluated on the initial test burners. One side is staggered bars to allow packing installation.

Q. No handle was shown for operating the spin vanes. Would one or two be used? Do we have experience with this arrangement?

A. The push/pull arrangement for the spin vanes and inner air disks use two handles each. This arrangement is our current standard for XCL burners. Before adopting as a standard, a full size mock-up was used to evaluate the design.

Q. Would slip joints come on the regulating rods for the registers?

A. Universal type slip joints will be used on the regulating rods for the outer air registers.

Q. Are conical diffusers included?

A. It was our thought that the existing coal nozzle assemblies would be used with the new registers assuming the existing nozzles are serviceable. Conical diffusers were therefore not included.

Q. On the lighter shrouds, if the strap fails, the shroud moves and interferes with the lighter, resulting in the burner being inoperable. A different design or perhaps a second strap would be in order.

A. We can review the supports for the lighter shroud in the detail stage of the engineering.

Q. Hard stops for minimum and maximum position on the outer air register are requested.

A. Mechanical stops can be supplied for the outer registers, however, they are probably unnecessary if electric drives are used.

Please advise if you or IPSC have any additional questions.

Very truly yours,

BABCOCK & WILCOX COMPANY

D.C. Langley
Regional Service Manager
Western Region

DCL:pm/369

cc: J.A. Nelson, IPSC
C.A. Palmberg, Barberton
E.L. Wells, Barberton
F.J. McGinley, Jr., Denver